

TIGERS

BY

R. I. POCKOCK, F.R.S.

*Temporary Assistant in the Zoological Department of the Natural
History Museum*

(With 1 coloured and 12 black and white plates)

INTRODUCTION

The collectors employed by the Mammal Survey of India, organized by the Bombay Natural History Society, received general instructions to pay attention particularly to the smaller animals and to leave 'big game' alone so as not to trespass upon the province of the sportsman. In a measure this is a matter for regret, because there is still much to be learnt about big game which will be the first to disappear from the fauna of India with the steady encroachment of man on the wilds; and this applies in particular to the tiger against which every man's hand is turned. The result of the instructions above referred to was the practical absence of spoils of the tiger from the collections secured by the Survey;¹ and since sportsmen very naturally like to preserve for themselves such handsome trophies as tigers' skins, the material of skins of this species from India in the Natural History Museum can almost be counted upon the fingers of two hands. This, with a few Persian and Manchurian skins, is a very small number upon which to come to definite conclusions with regard to the number of local races that may exist and the range of variation in size, pattern, colour and other characters upon which the admitted local races have been established. Of these there are some four or five, namely, the Mongolian, Persian, Indian and Sunda Islands races. But there is evidence for the existence of others, without the possibility of defining them owing to the absence of properly localized material. Even within the precincts of peninsular India, it is known that tigers vary to a certain extent locally according to environment; but information on this point, although full of interest, is at present very vague.

The main purpose of this paper is to summarize the characters of the tigers of different countries, so far as the limited material at my disposal admits; and to show incidentally the defects in our knowledge in the hope that sportsmen may realize that the National Collection at South Kensington is badly in need of skins and skulls of tigers from all the districts of the world where these animals are found.

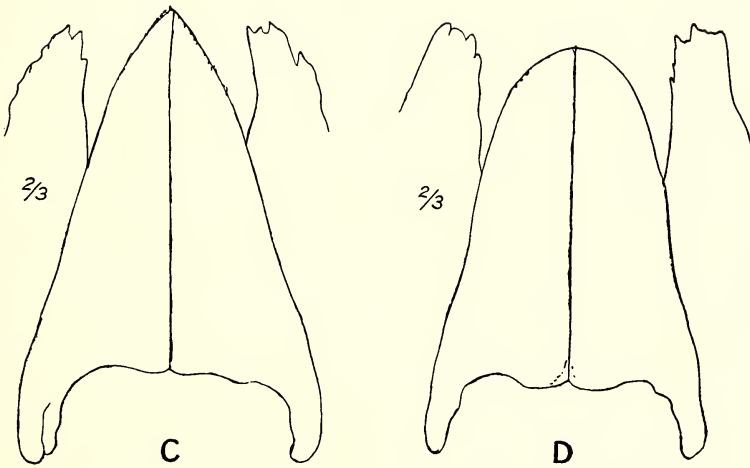
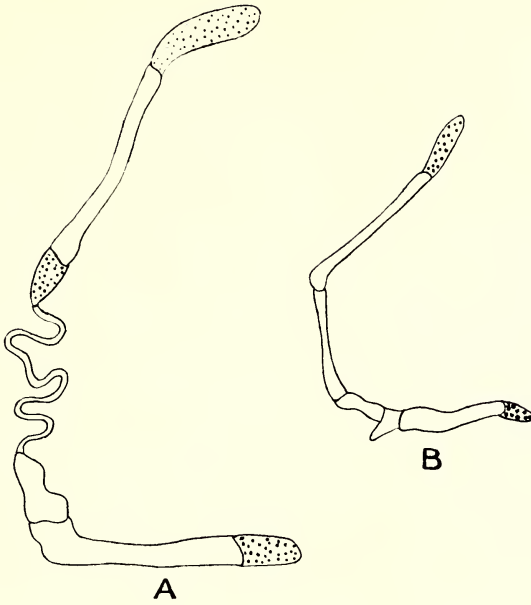
¹ Two, which would have been particularly interesting to me, namely one from Jog in Southern India and one from Tenasserim, were not forwarded to the British Museum.

THE NAME OF THE TIGER AND ITS KINSHIP WITH
THE LION

In the first place it is necessary to explain my use of the name *Panthera* for the tiger instead of *Felis* which will be familiar to most readers of this Journal. The type of the genus *Felis* is the common house cat (*F. catus*); and in the strictest sense in which *Felis* is now employed, it is limited to that animal and its near allies, the European wild cat (*F. sylvestris*), the North African and Asiatic wild cat (*F. ocreata*), the Indian desert cat (*F. ornata*) and a few others. But years ago the old naturalists perceived vaguely that the Felidæ or Cats of the world fall into several definite groups for which they proposed a number of generic names, without being able to lay their hands upon satisfactory characters to justify that course. One of these names was *Panthera*, given to the leopard. Now the leopard, jaguar, tiger, lion and snow leopard differ from all the other groups of Felidæ in a very interesting character. In the typical Cats the hyoid bone which strengthens and supports the larynx, or organ of voice, is held close to the base of the back of the skull by a series of short bones jointed end to end. But in the tiger, lion, leopard, jaguar and snow leopard, this series of bones is imperfectly ossified and largely replaced by a long elastic ligament, so that the larynx has great range of movement which is connected in some way with the voice. I do not know the voice of the snow leopard; but the roars of the lion, tiger and leopard or panther, are well known to all Indian sportsmen. These species, moreover, do not purr when pleased or in an ingratiating mood. In all the other Cats, including the hunting leopard, the sexual call is different from the deep-toned roar of the leopard-group and a feeling of content is expressed by purring. (Pl. A, figs. A, B.)

It was Richard Owen who in 1834 first pointed out this structural difference between the hyoid bone of the lion and some other members of the Cat family and correlated the modification with the difference in voice. In the case of the lion he stated that the suspensory ligament of the hyoid is six inches long and is capable of stretching to nine inches.

The tiger's hyoid is similar to the lion's and the roars of the two species are unmistakably alike in depth of tone. I have more than once heard people at the Zoological Gardens in London exclaim on hearing a tiger roar: 'Oh, listen to the lions roaring!' It is true that tigers never, in my experience, roar in chorus, and that the roar is, I believe, almost entirely a sexual call, consisting of a single intonation which may be repeated after an interval, but is never repeated in rapid succession with the head stretched forward in a line with the back as is the case with the lion. Now voice in animals is in nearly all cases a good indication of affinity; and no one who realizes this fact can doubt that the lion and the tiger are nearly allied forms, more nearly allied indeed than either is to the leopard or jaguar. The affinity, indeed, between the two giants of the Cat tribe needs to be insisted upon because an eminent American mammalogist recently defended his adoption of the generic name *Leo* for the lion and *Tigris* for the tiger because of



- A. Left side of hyoid of Tiger (*Panthera*) showing ligament, shortened and thickened by methylated spirit, joining the upper and lower bones.
- B. The same of domestic cat (*Felis*), on larger scale, showing continuous series of bones.
- C, D. Nasals and summit of maxillæ of Lionesses from Mulema and Barengoland, E. Africa, showing intergradation with those of tigers.

'the well-known differences between the two'; but he made no attempt to state what the differences are.

In its general reddish colour, relieved by black or, in parts, brownish stripes, white patches over the eyes and white under side, a typical tiger differs markedly from a lion; but the pattern of some lion cubs is very tiger-like as I have elsewhere shown (*Ann. Mag. Nat. Hist.* (7), xx, p. 437, 1907); and in the Sumatran tiger, described below, the white is much less conspicuous than usual and is even tinged with buff. Moreover, the Caspian tiger, also described in this paper, with all the normally black stripes brown and only a little darker than the ground colour, probably represents the stage passed through by the lion when losing his pattern. Hence in tigers occur variations from the normal pattern in the partial suppression of the black stripes and white areas approaching the uniform tint of the lion and showing that the differences between the two species in this particular are not of fundamental importance.

The mane, moreover, of the male lion is not a distinctive feature. It varies enormously within the species and may, indeed, be absent, as recorded by Col. Patterson of the man-eating lions of Tsavo. On the other hand, even Indian tigers sometimes have a distinct mat-like mane on the nape and in the old male Javan tiger recorded below the mane was as large as in many lions. I at one time thought there was a constant difference between lions and tigers in the direction of growth of the hair on the neck, that of the tiger growing backwards at least on the nape, whereas in the lion, as in the leopard, it streams forwards from a whorl on each side in front of the shoulder, the two streams meeting in the middle line of the nape to form a median crest, where the mane begins. But I find that tigers show great variation in this particular, the hair-growth in some specimens closely approaching that of the lion.

Again, if it be claimed that the lion is distinguished by having a black tuft at the end of the tail, it need only be pointed out that the size of this tuft is very variable and that it may be reduced almost to vanishing point.

From my observation of living animals I should say that a tiger has a more springy gait than a lion, with the back less straight and the loins decidedly weaker at least as a general rule; but both species vary a great deal in build and the differences are not of much importance.

As regards the skulls of lions and tigers, Blanford (*Fauna of British India: Mammalia*, pp. 56 and 59) gave two paragraphs to the points by which he thought they might be distinguished. But the examination of a larger series would have shown him the inconstancy of most of the characters he relied upon. Typically a tiger's skull is elevated above the orbits so that its upper profile is much more arched than that of a lion's skull which is manifestly flat in comparison. This difference in the shape of the head is usually very obvious in living animals. But the tiger's skull from Deli in Sumatra, described below, is as flat as any lion's; and if it be claimed that this peculiarity is due to the animal being reared from cubhood in captivity, I may add that the skull of the tiger

from Sungei Kumbang in Western Sumatra, obtained by Robinson and Kloss, is as flat along the top as the skull of many lions. (Pl. B.)

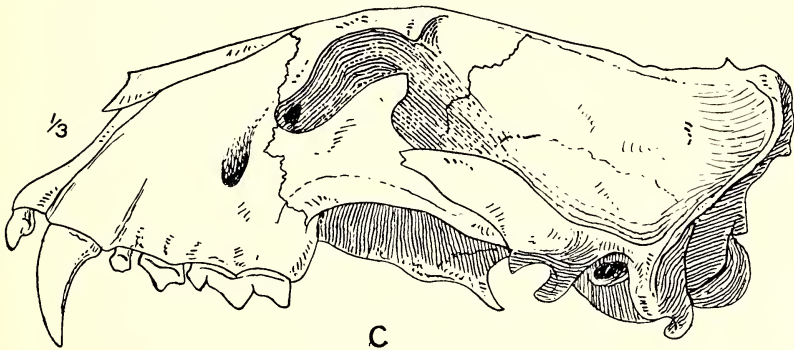
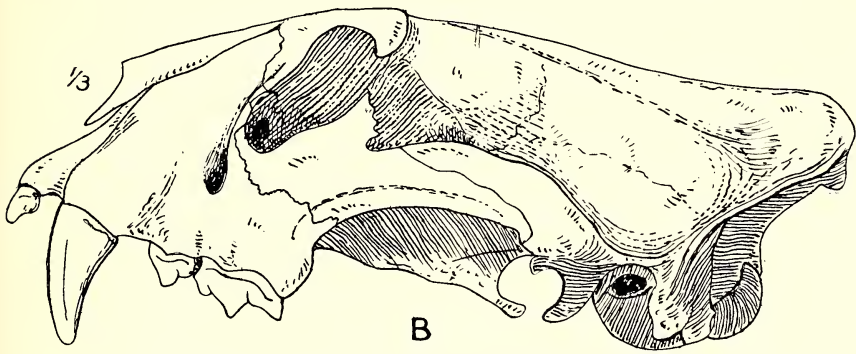
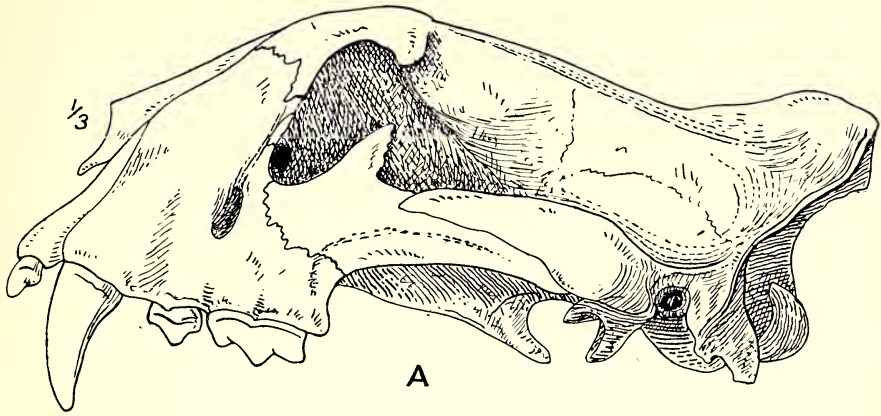
So, too, with the nasal bones. Typically in tigers' skulls the posterior ends of these bones project backwards in the middle line some distance beyond the maxillary bones which flank them at the sides, whereas in lions' skulls the ends of the bones in question are approximately on a level, the nasals being sometimes shorter. But the width and length of the posterior ends of the nasal bones in tigers' skulls are extremely variable as the sketches in this paper show, especially the sketches of these bones in the skull of an adult tiger from Nepal and another from Darjiling, which for geographical reasons may be assigned to the same race. The upper ends of the maxillæ in these skulls are also different, the Darjiling skull being much broader in the interorbital region than the one from Nepal. Again in the skulls from Mergui and from Sungei Kumbang and Deli in Sumatra, the nasal bones only overlap the maxillæ to a very slight extent, and show a complete gradation to the leonine type as also do the Sumatran skulls in the relative length and width of the nasals. For example, in the Sungei Kumbang skull the greatest width of the nasals by the nostrils is much more than half their length, whereas in the skull from Nepal the width is considerably less than half the length. (Pls. A. c. & d; C. A. & c, 1c.)

I find similar variations in the bones forming the roof of the posterior nostrils—a character which Blanford mentions as distinctive. All indeed, that can be said with regard to the cranial differences between these two species is that tigers on the average have more vaulted skulls, with longer, narrower nasal bones, narrower anterior nares, the facial part shorter as compared with the cranial part and the lower edge of the mandible straighter than in lions.

My purpose in pointing out these resemblances between the lion and the tiger is strongly to protest against the view that the differences are sufficiently important to justify their assignment to two distinct genera and to support my own opinion that they are merely two well-marked species of the genus *Panthera*. And since tigers, wherever found, are obviously the 'same' animal, I regard the different kinds that have been described merely as local races, or subspecies, and not as distinct species under the names *Tigris tigris*, *Tigris amurensis*, *Tigris sondaica* etc., as is done by the Russian Zoologist, Satunin, and some other authors quoted in the Synonymies given below.

THE DISTRIBUTION OF THE TIGER IN THE PAST AND NOW

Skeletal remains of tigers indistinguishable from the existing species have been found in Pleistocene deposits in northern Siberia even as far to the north as the New Siberian Islands in the Arctic Ocean, well within the Arctic Circle, north of latitude 70° and far to the north of the animal's present range. They were associated with the remains of the elk, reindeer, Persian red deer (maral), musk ox, saiga antelope, horse, brown bear, polar bear, Arctic fox and



- A. Skull of Tiger (*Panthera tigris tigris*) from Central Provinces, showing typical shape in the Indian race.
- B. Skull of Sumatran Tiger (*Panthera tigris sumatrae*) from Sungei Kumbang, showing likeness to the Lion's skull.
- C. Skull of Lioness from Mulema, Uganda, for comparison with A, B.

wolf which are still in existence, and of a bison, the mammoth and woolly rhinoceros now extinct (Tscherski, *Mem. Acad. St. Petersburg*, vol. 40, 1892). From the nature of this fauna of nowadays mixed temperate and northern types, it must be inferred that northern Asia throughout Pleistocene times was free from the glaciation which supposedly affected other parts of the hemisphere and supported a rich vegetation of grass, shrubs and trees supplying food for the Ungulates upon which the Carnivora preyed, and that the present arid, inhospitable condition of the country, with its rigorous climate, is of comparatively recent date (Hinton, *Proc. Yorkshire Geol. Soc.* 1926).

Since the bones above referred to are the earliest known remains of the tiger, it may be concluded, as a working hypothesis, that central and northern Asia was the original home of the species; and this conclusion helps us to understand the distribution of the species at the present time. It survives in Mongolia, Amurland, Manchuria and Corea, its most northern districts; and in the south-west of Asia, from the Russo-Afghan boundary, to the north of the Hindu Koosh, through the Elburz mountains, south of the Caspian, as far as the eastern portions of the Caucasus. There is evidence that the tigers of the Perso-Turkestan district are, or were, continuous in their distribution with those of Mongolia; and from the occurrence of tigers in northern China and southwards, there is no doubt of continuity in the distribution of the species in eastern Asia from Manchuria southwards. From South China, tigers extend through Burma, Siam and the Malay Peninsula into the Sunda Islands of Sumatra, Java and Bali, but not into Borneo,¹ Bali being the limit of the range of the species in south-eastern Asia.

Since tigers are not found in Tibet or on the northern slopes of the Himalayas, and since those of Burma and Assam seem to be the same in all essentials as those occurring on the southern slopes of that mountain range, it may be inferred that the species entered India from Burma round the eastern end of the Himalayas and travelled thence westwards along those mountains through Bhutan and Nepal and in Peninsular India reached as far as Gujerat in the west and Cape Comorin in the south, arriving at the latter point too late to get into Ceylon. This view of the route by which the tiger gradually spread over India is borne out by several facts. Major Burrard, for instance, states that in the Himalayas tigers are more numerous to the east of the Bhagirathi river, a tributary of the Ganges, than to the west of it (*Big Game Hunting in the Himalayas and Tibet*, p. 243, 1925). Moreover, the tigers of the Perso-Turkestan district are somewhat different from those of north-western India and were doubtless excluded from India by the Hindu Koosh and the desert areas of Persia and Baluchistan.

¹ The idea that the tiger exists in Borneo is perhaps due to the record of an old skull, ticketed Borneo, in the British Museum. This skull, judging from its size and shape, is that of an Indian tiger.

THE SIZE OF TIGERS

Height.—In Rowland Ward's Records there are a number of estimated heights of Indian tigers.¹ These range from 3 ft. 3 ins. (39 ins.) to 4 ft. 2 ins. (50 ins.), the latter measure being taken from a skin from Seonda measuring 10 ft. 3 ins. in total length, a good but not very exceptionally large specimen. It is stated, moreover, that the Maharajah of Cooch Behar measured a tiger standing 3 ft. 10½ ins. (46½ ins.) at shoulder. It is not explained how this measurement was taken.

When I was Superintendent of the Zoological Gardens in London I measured many tigers by means of a graduated scale on the front of the cage. By watching the animals standing alongside or passing this scale day after day it was possible to judge their actual standing height with tolerable accuracy, most certainly well within 1 inch. The largest tiger in the Collection was a Manchurian specimen, and all the Indian sportsmen, acquainted with tigers, who saw him, agreed that he was a splendid animal. Yet his standing height at the shoulder was only just about 3 ft. 2 ins. (38 ins.). That is to say, he was 8½ ins. lower than the Indian specimen measured by the Maharajah of Cooch Behar, 1 in. lower than the smallest of the tigers whose estimated height is published in the Records and exactly 1 ft. (12 ins.) lower than the largest of those, namely, the tiger from Seonda! This measurement may, however, be reasonably set aside as due to the inadvertent addition of 1 ft. to the animal's stature; and the estimated measurements may be neglected as such. But the case of the tiger with the alleged standing height of 3 ft. 10½ ins. is on a different footing. Personally, I reject it without hesitation; and for the following reason. A good Indian tiger stands just about 3 ft. at the shoulder and measures about 10 ft. long from nose tip to tail tip. That is to say, his length is roughly 3½ times his height. Judged by this method the Manchurian tiger standing 3 ft. 2 ins., above referred to, measured about 10 ft. 7 ins. long, a reasonable estimate. But by the same standard the tiger stated to have been 3 ft. 10½ ins. at the shoulder was close upon 13 ft. long, which, as every sportsman knows, is a preposterous supposition.

Length.—The lengths of tigers have been discussed *ad nauseam* and I have nothing to add here to what has already been written by competent sportsmen on this subject, except to say that what is required for a correct understanding of the variations in the size of tigers are accurate measurements of properly sexed, adult individuals, whether large or small, from as many localities as possible. From the scientific standpoint small tigers are quite as interesting as large tigers.

Very useful tables giving the dimensions of Indian tigers may be found in Rowland Ward's Records. Particularly interesting is the table (p. 474, ed. 1928) compiled by Sir J. P. Hewett, who states that out of a total of 250 specimens he has seen shot only eight

¹ It is not quite clear whether these heights were taken by the owners in the field from the dead body or from the stripped skin.

tigers ranged from 10 ft. and $\frac{1}{2}$ an inch to 10 ft. $5\frac{1}{2}$ ins. and only seven tigresses were between 9 ft. and 9 ft. 3 ins. It will be noticed that all the tigers were from Naini Tal or Garwhal and five of the tigresses from the same places; one from Bijnor and only one, the smallest, from as far south as Hoshangabad in the Central Provinces. But what of the remaining 235 specimens? Are we to infer that all the tigers of Naini Tal are large? Or did any of the smallest come from that locality as well? Those are the kinds of facts one wants to know.

WHITE, RED AND BLACK TIGERS

Apart from comparatively slight individual or local variations of the normal type of colour, tigers sometimes exhibit striking variations due to suppression of pigment resulting in so-called white tigers or to development of pigment resulting in black tigers.

So-called white tigers are particularly interesting from the different grades of albinism they show. Of these three types are known.

1. Tigers in which the red pigment is abstracted from the ground colour leaving it cream or white with the stripes standing out boldly in 'dark brown', 'chocolate' or 'reddish black' as observers have described. To this, the commonest, variety belong a white tigress from Orissa (*Journ., Bomb. Nat. Hist. Soc.*, vol. xix, p. 744, 1910); a tiger from Bilaspur (*Journ., Bomb. Nat. Hist. Soc.*, vol. xxiv, p. 819, 1916); a tiger caught alive in the jungles of Sohagpur (*Journ., Bomb. Nat. Hist. Soc.*, vol. xxvii, p. 932, pl. 1921); and a few recorded from Rewa. Of these there is in the British Museum a mounted specimen deposited by H. M. King George V, to whom it was presented by the Maharajah of Rewa.

2. Like those of the first category but with the black pigment of the stripes diluted to tan. I am only acquainted with one example of this type, namely, a skin from Mirzapore presented to the British Museum by Mrs. Craigie Halkett. This type is intermediate between the first category and the one that follows.

3. Tigers exhibiting the extremest stage of albinism, pigment being absent not only from the ground colour but also from the stripes. Of this type I am only acquainted with one record, namely, a tiger exhibited in about 1820 in the Exeter Change and figured and described by Hamilton Smith. In this animal, the locality of which is unknown, the stripes were only visible in certain lights, as in the case of some albino tabby cats. J. G. Wood also described it, with a figure not taken from life, in the first volume of his well-known Natural History, 1861.

Other white tigers which cannot be classified owing to absence of particulars have been recorded, namely, one, presumably from Poona, by Howard Saunders (*Proc. Zool. Soc.* 1891, p. 373); two tigresses from Bhagalpur, and two tigers from the Central Provinces, one being from Korea (*Rowland Ward's Records*, 1928, p. 478).

Possibly the red tiger, illustrated in our coloured plate and recorded below under the heading *Panthera tigris septentrionalis*,

should come into this category of aberrations. It is a unique type with all the black pigment abstracted from the stripes, leaving them reddish-brown and only a little darker than the ground colour.

Black tigers are much rarer than white tigers. There appear to be only three records. Blanford, in his volume on the Mammalia of the Fauna of British India Series, refers to one seen in Chittagong by Mr. C. T. Buckland in 1846. A full account of the incident was published in the *Field*, vol. 73, p. 422, 1889. The animal was found dead, killed by a poisoned arrow, and decomposition was so far advanced that the skin could not be saved. A second was seen near Bhamo and wounded but made its escape, leaving its pug marks as evidence that it had not been mistaken for a large black leopard, as recorded by Mr. Hauxwell (*Journ., Bomb. Nat. Hist. Soc.*, vol. xxii, p. 788). The third, found dead like the first, was seen in the Lushai Hills; but in this instance also the skin could not be saved (*Field*, 1928, p. 656).

It is interesting to note that these black tigers all came from localities, tolerably near at hand, to the north-east of the Bay of Bengal; and it is significant that black leopards are far more plentiful in what was formerly called Further India than in Peninsular India.

INDIAN TIGERS

Before the existence of local races, or subspecies, of tigers was established, the name *Felis tigris* was applied in a comprehensive sense by early writers to tigers in general. But the subsequent admission of the occurrence of geographical races and their designation by distinguishing titles necessitated the restriction of *tigris* to one particular form. In this matter I follow the opinion expressed by Oldfield Thomas in his paper on the Mammals described by Linnæus in the 10th edition of the *Systema Naturæ*: 'Later revisers of the races of tigers, of whom Fitzinger and Matschie may be specially quoted, have restricted *F. tigris* to India proper and particularly Bengal' (*Proc. Zool. Soc.*, 1911, p. 135). The Bengal tiger, therefore, becomes the representative of the race *Panthera tigris tigris* and the example in the Natural History Museum, ticketed Bengal (Col. Sanderson), which is described below, may be regarded as a toptypical specimen of it. It is important to bear this in mind in view of the possibility of the admission of other Indian races in the future. At present, however, I refer all Indian tigers to the same race, the name of which, with its principal synonyms, is as follows:—

Panthera tigris tigris, Linn.

Felis tigris, Linn., *Syst. Nat.* ed. 10, p. 41, 1758; and of most authors who have written on Indian tigers, including Blyth, Jerdon, Blanford and others.

Tigris regalis, Gray, *Cat. Mamm. Brit. Mus.*, 1842, p. 40; also of some other authors, including Hodgson.

Tigris striatus, Severtzow, *Rev. Mag. Zool.*, 1858, p. 386.

Type Locality. Bengal.

Distribution. India from the southern slopes of the Himalayas to Cape Comorin; also some of the countries to the east of the Bay of Bengal.

The names *regalis* and *striatus* were proposed respectively by Gray and Severtzow because, adopting *Tigris* in a generic sense, they thought they had the right, not now admitted, to alter the specific name to suit their personal dislike of identity between the generic and specific titles of an animal.

SKINS OF INDIAN TIGERS

I have already referred to the vagueness of our knowledge of the local, seasonal and individual variations in colour in Indian tigers, although it seems to be generally agreed that such variations occur. For instance, Major F. G. Alexander, writing on this subject (*Harmsworth's Natural History*, vol. i, pp. 378-379, 1910) says:—'My field of observation has been limited to Rajputana, Central India, and Bundel Khand, the jungles in which may be called "open jungles". The colour of all the tigers killed by myself and by brother sportsmen was, with two exceptions, "a light red ochre." One exception was a tiger, lured from a cave in the Asseerghur jungles, whose colour "was dark red ochre, far darker than that of any tiger I have ever killed."' Another interesting variety he described as follows:—'I have killed tigers during the hot weather, monsoon and cold weather; and as regards the length of their hair, I have found very little difference between a cold-weather tiger and a hot-weather tiger. There was, however, one exception. This was apparently a very old male, measuring only 8 ft. 1 in., shot in Pertaburgh territory within 20 miles of Neemuch; his fur was quite an inch long all over the body; his colour was ruddy ochre, the ruff round the neck was particularly full and his whole appearance led me to regard him as a dwarf-like specimen. If the skin had been exposed for sale in a furrier's shop, it would have been accepted as a Chinese or Siberian specimen.' These are interesting instances of individual variation. As regards environmental varieties, Major Alexander says:—'There is no doubt that in dark jungles, such as those of the Siwaliks or the Dun forests, animals' [tigers'] skins assimilate themselves to the localities . . . but in open jungles the pigment of the tiger's skin is invariably light. The Beemashunker, Kanara and Belgaum jungles contain darker-coloured specimens, and I have seen skins from them all which were, on the average, far ruddier than the thirty-one I have obtained and a dozen more which I have seen killed.'

I have selected these extracts at random from a volume that happened to be at hand, not doubting that other Indian sportsmen have published similar experiences. But the observations recorded require to be amplified and extended to all parts of India if the tigers are ever to be known as some of the groups of smaller mammals are now known, thanks to the Survey carried out by the Bombay Natural History Society.

Owing to the scanty material at my command I can contribute very little to this end; but possibly the subjoined brief notes on the

skins in the British Museum may be useful in a small way as a basis for further observations which so many Indian sportsmen have the opportunity for carrying out. Such information would be much more interesting and important than records of weights and measures.

In the first place my experience with living tigers, when I was Superintendent of the London Zoological Gardens, confirms Major Alexander's observation regarding the absence of any marked seasonal change in colour or thickness of coat in Indian specimens, whether they come from Nepal or Mysore. That the absence of such change was not attributable to their conditions of life in England was shown by a pair of Manchurian tigers which with perfect regularity donned a thick winter coat during the ten years they were under my charge. But there may be parts of India in which seasonal changes do occur.

The skins in the Museum are as follows:—

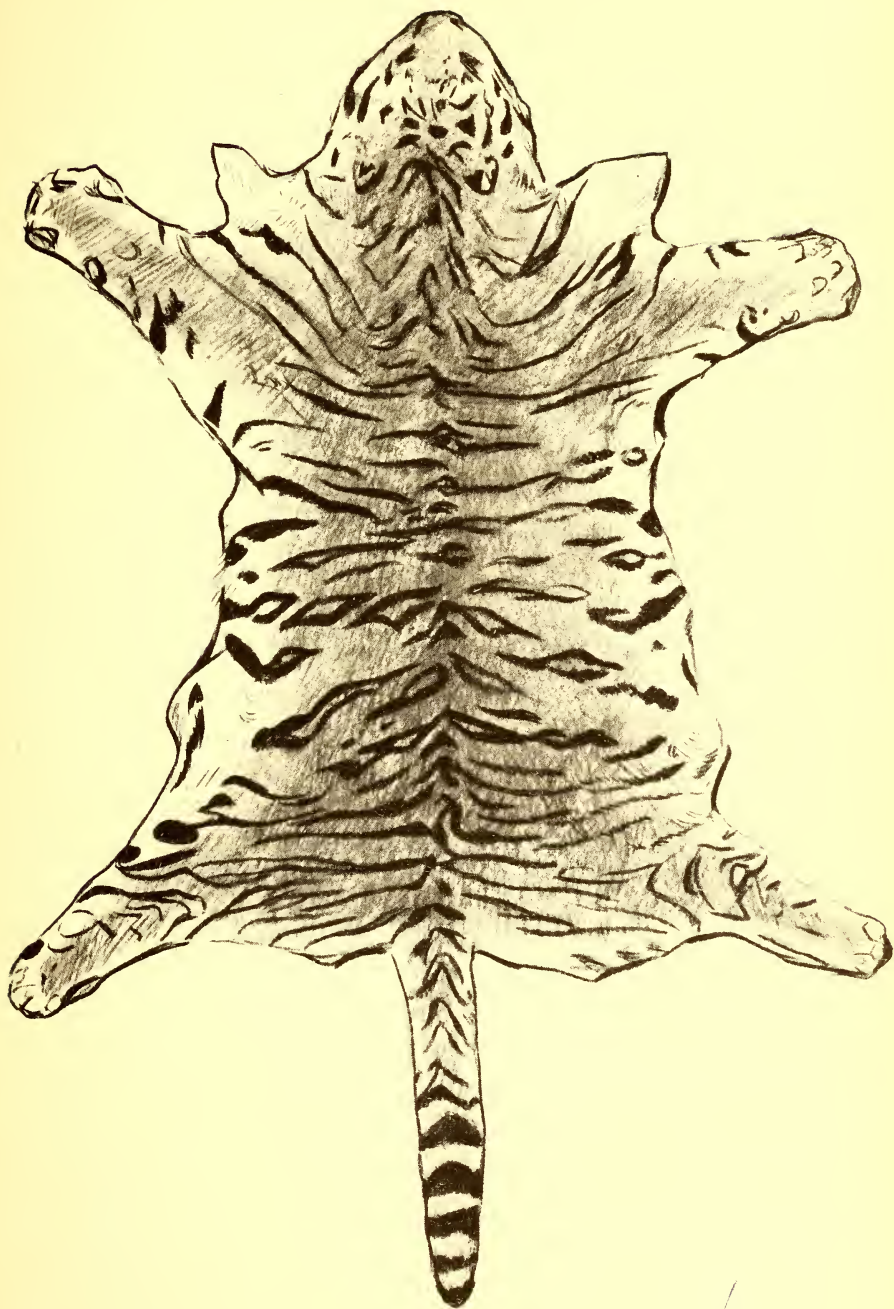
1. *Nepal*.—A mounted tigress presented by King George, is a normally coloured, fully striped, rather rough-coated specimen, differing very considerably from a couple of tigresses from the same country presented to the Zoological Society by the King, when Prince of Wales. These tigresses were short and smooth coated throughout the year, although kept in the open all through the cold weather. They were remarkable for the reduction both in number and length of their stripes, of which scarcely any showed signs of looping. The greater part of the shoulder, the outside of the fore leg and a large area of the side of the body behind the shoulder were without stripes, and, except at the very base, there was only one stripe on the inner side of the fore leg. On the hinder part of the body the stripes were comparatively thin and widely spaced. I published a photograph of one of these tigresses, which were probably from the same litter (*Proc. Zool. Soc.*, 1908, p. 892) and photographs of one or the other may be seen in *Harmsworth's Natural History*, vol. i, pp. 373, 374, 378. It would be particularly interesting to know if these two different types of tiger occur under the same or different conditions in Nepal. (Pl. D, upper fig.)

2. *N. W. Provinces*.—A mounted tiger, presented by P. Wyndham in 1903, is a short-haired, very handsome large specimen, richly coloured, but not dark, and well marked with broad, black, looped stripes.

3. *Bengal*.—A dressed skin of a tiger, presented by Col. Sanderson, closely resembles the last in coat, colour and pattern. The skull belonging to this skin is one of the largest in the collection, but the dressed skin measures just under 10½ feet. (Pl. II.)

4. *Mirzapore*.—A dressed skin of a white tiger with tan stripes, presented by Mrs. Craigie Halkett. It is just under 10 feet in length and is approximately similar in pattern to the skin from Bengal.

5. *Rewa*.—A mounted white tiger, with deep chocolate stripes, deposited by H. M. The King, closely resembles the last two in the extent, spacing and formation of the stripes.



SKIN OF BENGAL TIGER.

6 and 7. *Chota Nagpur*.—The dressed skins of two tigresses, from Palamau, presented by Capt. S. N. Walker, are not so brightly tinted as the Bengal Tiger, but since they had been made up as rugs, their paler hue is very likely due to exposure to light. The stripes show pale ticking. Otherwise they are well defined. One skin, however, has a bolder pattern of broader stripes than the other and is altogether handsomer. They measure respectively 9 ft. 8 ins. and 9 ft. 5 ins., but the head and body of the latter are 6 ft. 8 ins., its inferiority in total length to the other, which has a head and body length of 6 ft. 3 ins., being due to the incompleteness of the tail.

8. *Guzerat*.—The flat skin of a young tiger obtained by Major B. H. O'Donnell at Dunta in Palanpur is pale in colour, with spaced, looped stripes, but the loops are short. On the croup the stripes fuse dorsally on each side, leaving a narrow longitudinal pale area nearly as well defined as in the skins of the Persian and Afghan boundary tigers described below.

9. *Thana*.—The flat skin of a full-grown tiger, shot by Mr. T. B. Fry in 'open' jungle, about 40 miles north of Bombay, is rather like the Palanpur skin but is still paler, the general hue being tawny and everywhere blending with the white. The white on the belly is extensive, the two combined about equalling the tawny area between them. The skin measures only 8 ft. 7 ins., of which the head and body are 5 ft. 9 ins.

10. *Coimbatore*.—A flat skin of an old tiger, presented by Mrs. Cozens, is very pale, the white everywhere blending with the pale tawny hue of the ground colour, but the pallid hue is probably due to exposure to light, the skin having been made into a rug. The coat is very short and smooth, and the stripes are thin and not nearly so black as in most Indian tigers owing to the hairs being pale at the base. The skin measures 10 ft. 2 ins.; but the label indicates that in the flesh the animal was only 9 ft. 4 ins., small, that is to say, for an Indian tiger.

11. *Madras*.—The flat skin of a tiger presented by Col. Sykes resembles the less handsome of the two Chota Nagpur skins in coat, colour and narrowness of the stripes, but the stripes are more numerous; the hair on the cheek and throat is much longer than in the other skins described, and there is a distinct mat-like mane, 2 ins. or more in length, extending over the nape from the occiput. The skull shows that this skin was that of an adult animal, but the head and body measure only 5 ft. 6 ins., the tail being absent.

12. *Coorg*.—The skin of a tigress, shot by Mr. G. C. Shortridge is the only representative of the species that reached the British Museum from the Survey. It is a richer and darker tinted skin than those from Chota Nagpur but hardly darker than the one from Bengal. All the stripes are deep black and well defined, broad, normally spaced and some of them looped. The coat is longish and rough. It measures 8 ft. 9 ins., but since the tail and head are very much stretched from being pegged out to dry, the tigress was evidently quite a small animal. But there is no skull by which her age can be determined.

SKULLS OF INDIAN TIGERS

(Pls. B A ; C A-D.)

To make clear the terminology used in the tables of skull-measurements in this paper it may be explained that the dimensions have been taken with callipers and dividers as follows :—

Total length from the edge of the occipital crest to the tip of the premaxillæ above the incisor teeth.

Condyllo-basal length (*Cond. bas.*) from the posterior edge of the occipital condyle to the tip of the premaxillæ. This is a more satisfactory measurement than the first because it is independent of the development of a muscular ridge.

Zygomatic width (*Zygom.*) across the cheek-bones.

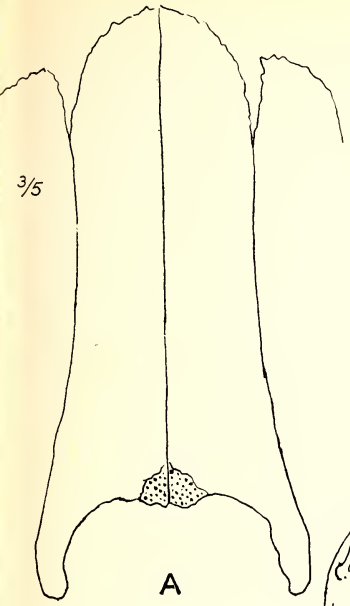
Nasals ; the length is taken from the middle line on the forehead to the tip of the process bounding the nostrils laterally above, and the width across the nostrils from process to process outside.

Occiput ; the width is taken as nearly as possible at the points where the vertical sides pass outwards into the lateral processes ending in the mastoids behind the orifice of the ear ; the height of the occiput varies with the development of the median crest at its summit.

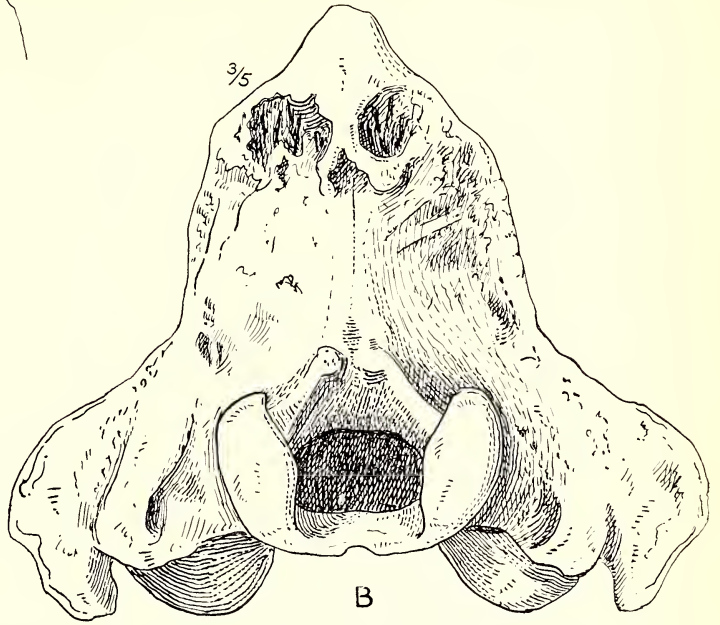
Teeth ; these are measured in millimetres, not in inches, the upper flesh-tooth (*Upper carn.*) along its outside edge, and the lower flesh tooth (*Lower carn.*) from front to back, both being subject to small variations with wear. The *Canine* is measured from front to back close to the socket.

In the last edition of *Rowland Ward's Records*, 1928, pp. 480–481, the dimensions of a large number of skulls of Indian tigers are given. They vary from about 13½ inches to just under 16 inches, the largest marked —16 having been obtained by Mr. B. B. Osmaston in Naini Tal. Roughly, 50 per cent of them are between 14 and 15 inches and about 25 per cent between 15 and 16 inches and 13½ and 14 inches respectively. They appear to be the skulls of males, and their average length may be put at 14½ inches. It may be noted that they range in distribution from the Himalayas to the Central and United Provinces, there being only one record from Southern India, namely, from Kanara.

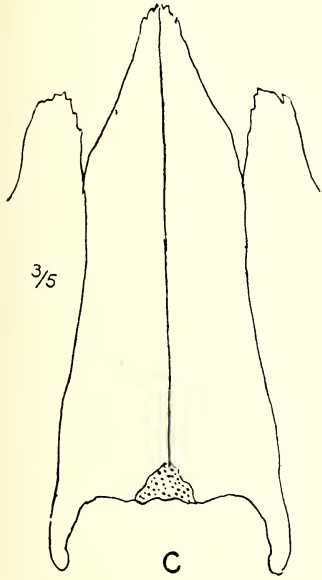
In the following Table I give the dimensions of some skulls of Indian tigers in the British Museum ; but here again there are only two complete skulls from Southern India available, namely, from Kanara and Madras. The skulls have been arranged in the list, not by size but by locality.



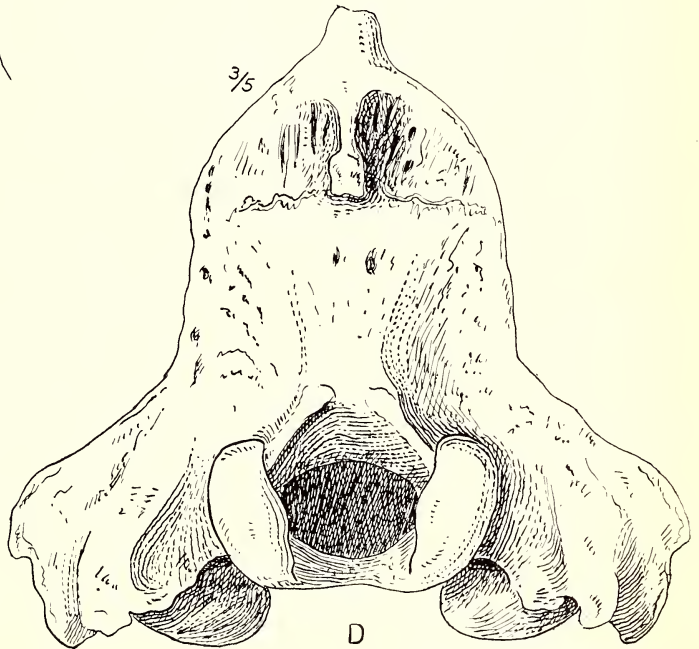
A



B



C



D

A. Nasals and summit of maxillae of Tiger from Darjiling.
 B. Posterior view of occiput of the same.
 C,D. The same bones of a Tiger from the Nepal Terai.

English Inches

Millimetres.

Loc. and Sex.	Total length.	Cond. bas. length.	Zygom. Width.	Nasals.	Occiput.	Upper carn.	Lower carn.	Base of canine.
Darjiling ♂ ...	15	13½	10¾	5 × 2½	3¾	37	30	29
Khatmandu ♂ ...	...	...	9 ³ / ₁₀	4 ⁷ / ₁₀ × 2½	...	37	29	27
Nepal ♂ ...	14	12 ¹ / ₁₀	9½	5 × 2 ³ / ₁₀	2 ⁹ / ₁₀	36	...	28
Nepal ♂ ...	13 ⁴ / ₅	12	9¾	4 ⁴ / ₅ × 2 ¹ / ₁₀	3 ¹ / ₁₀	38	28	26
Nepal ♂ ...	13 ⁴ / ₅	12½	9½	4 ⁴ / ₅ × 2¾	3½	37	27	29
Nepal Terai ♂ ...	14 ³ / ₁₀	12¾	10½	5 × 2½	2¾	...	29	29
Bhutan Terai ♂ ...	14 ³ / ₁₀	12 ⁴ / ₅	9¾	5 × 2¾	3¾	35	27	28
Bengal ♂ ...	14 ⁹ / ₁₀	13 ¹ / ₁₀	10½	5¾ × 2½	3½	37	27	30
C. Prov. ♂ ...	14½	12¾	10¾	5 × 2¾	2¾	36	26	28
C. Prov. ♂ ...	13 ¹ / ₁₀	11 ⁷ / ₁₀	9 ⁹ / ₁₀	4½ × 2 ⁴ / ₅	3	35	25	26
Kanara ♂ ...	12 ⁴ / ₅	...	9	4 ¹ / ₁₀ × 2 ¹ / ₅	2 ⁷ / ₁₀	36	26	26
Madras ♂ ...	12½	11 ³ / ₁₀	8 ⁴ / ₅	4 ² / ₅ × 2 ¹ / ₁₀	2 ⁴ / ₅	34	26	25
Nepal ♀ ...	12 ³ / ₁₀	10 ⁹ / ₁₀	7 ⁴ / ₅	4 ¹ / ₁₀ × 2	2½	35	26	23
Nepal ♀ ...	12½	10 ⁷ / ₁₀	7 ⁴ / ₅	4 ² / ₅ × 2	2 ³ / ₅	33	24	21
Nepal Terai ♀ ...	11 ⁴ / ₅	10¾	7 ⁷ / ₁₀	4 ¹ / ₁₀ × 2 ¹ / ₁₀	2¾	35	26	23
Muttra ♀ ...	11 ² / ₅	10½	7¾	3 ⁹ / ₁₀ × 1 ⁹ / ₁₀	2 ⁴ / ₅	31	22	20
Mirzapur ♀ ...	11 ⁹ / ₁₀	10 ³ / ₁₀	7 ⁴ / ₅	4½ × 1 ⁹ / ₁₀	2½	33	24	23
Chota Nagpur ♀ ...	11¾	10½	8	4 × 2 ¹ / ₁₀	2 ⁷ / ₁₀	32	...	21
Chota Nagpur ♀ ...	11¾	10 ³ / ₁₀	7 ⁹ / ₁₀	3 ⁹ / ₁₀ × 2	2¾	32	25	20

In addition to these skulls there are several others in the British Museum; but since they are merely ticketed India and show no special features, their measurements have not been included; and all immature skulls have been omitted.

The average length of male skulls is about 14 inches and of the females about 12 inches. Female skulls are also relatively lighter and less muscularly developed, and the occipital condyles touch, or nearly touch, a flat surface when the skull rests upon it; also the carnassial teeth are a little smaller and the canine markedly thinner at the base and shorter; but I have not recorded the length of the canine in either sex because it varies with age and wear. In most cases no sex mark is indicated on the labels; but by the use of the

above-mentioned data, any normal tiger's skull can, I believe be sexed correctly. The skull, for instance, from Kanara, which was presented by R. C. Wroughton, although labelled ♀ I have no hesitation in regarding as a ♂. The label is not in Wroughton's handwriting; and I know nothing further of the history of the specimen, but Mr. T. B. Fry, who knew Wroughton well, tells me he does not think he ever shot a tigress in Kanara. The skull from Madras (Col. Sykes) I also sexed by the characters mentioned.

The interesting point about these two skulls is that their average dimensions are considerably below those of the male skulls from northern and Central India, intergrading between them and the tigresses' skulls from those districts. They confirm, indeed, the opinion generally held, I believe, by Indian sportsmen, and expressed by Dunbar Brander, that the tigers of South India are smaller than those of North and Central India. On the other hand, a skull from Kanara in Rowland Ward's Records for 1928 measures $14\frac{1}{4}$ inches and is about as large as most northern tigers' skulls; but of course intergradation occurs. Also the jaws taken from the tiger's skin from Coimbatore, referred to above, are more massive than those of the British Museum skulls from Kanara and Madras, indicating a larger beast; but the skin in question measured only nine feet four inches in the flesh, which is decidedly small for a northern tiger.

There is one other skull to which I must refer in this connection, namely, that recorded by Mr. Prater as a record panther skull (*Journ., Bombay Nat. Hist. Soc.*, vol. xxvii, p. 933, 1921). The animal was shot in the dusk near Ootacamund by Mr. Limouzin¹ who thought it was a panther and subsequently found in the jungle its presumed remains eaten by jackals, with none of the pattern of the skin remaining. Struck by the size of the skull, he sent it to the Bombay Natural History Society where it was determined by Mr. Prater as certainly a panther's, and a good record at that, the *basal length* being $11\frac{3}{10}$ inches, the leopard's skull, which at that date headed Rowland Ward's list, being a skull from the Gaboon, owned by Sir Edmund Loder, which I described and measured in 1909. This skull had a *total length* of $11\frac{1}{8}$ inches and a *basal length* of only 9 inches,² that is to say $2\frac{1}{2}$ inches shorter than Mr. Limouzin's specimen. There is no doubt that the latter was the skull of a tiger or tigress, probably a tiger since its basal length is exactly the same as that of Col. Sykes' Madras specimen. True it is nearly $\frac{1}{2}$ an inch narrower across the zygomata, but that discrepancy is of no great moment, as may be seen by comparing the lengths and breadths of the skull from Bengal and of the one from the Central Provinces

¹ (*Vide* note on page 699 of this Number—EDS.)

² I have italicized these measurement because, although this leopard's skull from the Gaboon was correctly entered in Rowland Ward's Records 1914 as measuring $11\frac{1}{8}$ inches in *total length*, in the 1928 edition that figure is stated to be its *basal length*, which is quite wrong. According, indeed, to the table printed in that edition (p. 485), four of the leopards' skulls are longer than any Indian tigress's skull I have measured and as long as several of the tigers' skulls.

that comes next to it in my table. Fortunately Mr. Prater published a photograph of the skull of Mr. Limouzin's specimen alongside those of an Indian leopard, tiger and lion.¹ From this it may be seen that the jaws and canine tooth of the first, the alleged record panther, are much larger than those of the leopard. Mr. Prater, moreover, records the weight of the skull as 2½ lbs., which is ½ a lb. heavier than the heaviest leopards' skulls, all African, in Rowland Ward's list. In this list of leopards Mr. Limouzin's tiger takes fourth place for size—it is really, on the data given, entitled to the third place—but it should stand easily first, because its total length was no doubt nearly 13 inches. Apart, however, from the errors to which the records of this skull have given rise, it is an exceedingly interesting thing that the skull of a South Indian tiger, if adult, should be so small as to be mistaken for a panther's.

The history of the specimens mentioned in my list, setting aside the two from Kanara and Madras, is as follows:—The skulls from Nepal came from Hodgson's and Hardwicke's collections; those from the Nepal Terai were shot by King Edward VII, when Prince of Wales; those from Bengal and Mirzapur were secured by Colonel Sanderson; from Darjiling by E. le F. Davys; from Khatmandu by H. A. Oidfield; from the Bhutan Terai, north of Kangrabai, by M. Maxwell; the smaller of the two from the Central Provinces was presented by F. W. Withers and the larger came from Mawlla and was presented by B. B. Osmaston. This skull is wider across the zygomatic arches than any in my list or Rowland Ward's list; and since a tiger shot by Mr. Osmaston at Naini Tal heads Ward's list with a length of 16—, Mr. Osmaston holds the records for length and width. The two tigress's skulls from Chota Nagpur (Palamanu) were taken from rugs presented by Capt. S. N. Walker.

The tigers from Assam, Burma and the Malay Peninsula of which I have seen no skins and only a few skulls, are briefly dealt with in a later part of this paper. They are provisionally referred to the same race as the Indian tiger, *Panthera tigris tigris*.

THE TIGERS OF THE CASPIAN AREA

The name and synonymy of these tigers, known to the ancients as the Hirkan Tiger, are as follows:—

Panthera tigris septentrionalis, Satunin.

Felis virgata, (ex Illiger) Matschie, *Sitz. Ber. Ges. Nat. Fr. Berlin* 1897, p. 13 (name preoccupied by *Felis virgata* given to the Norwegian lynx by Nilsson in 1829).

Felis (Tigris) tigris septentrionalis, Satunin, *Zeitschr. 'Priroda iochota'*, vii, p. 5, 1904.

¹ In confirmation of his opinion that the skull under debate was a panther's, Mr. Prater draws attention to the height of the tiger's occipital condyles above the surface of the table on which it rests, whereas in the other three skulls they rest upon it. But in many skulls of tigers the condyles similarly rest on a horizontal plane,

Tigris septentrionalis, Satunin, *Mitth. Kauk. Mus.* ii, p. 308, pl. iv (skull), 1905-1906; *id.*, *op. cit.* iv, p. 33, 1909; *id.* *Conspect. Mamm. Imp. Ross.* p. 156, 1914 (printed in Russian).

Tigers were procured near Lenkoran in Talish on the coast of the Caspian, to the south of the Caucasus, by Radde in 1866 and were identified as *Felis tigris*. But in 1897 a specimen, exported from Tiflis and exhibited in the Berlin Zoological Gardens, was seen by Matschie who, considering it to represent a race distinct from the typical tiger, called it *Felis virgata*. An enlarged photograph of this tiger was published by Dr. Heck (*Lebende Bilder*, p. 157, 1899), a volume containing photographs of a number of interesting mammals living in the Berlin Gardens at the time. The name adopted by Matschie for this animal was, however, inadmissible for the reason stated in the above-quoted synonymy. Subsequently, in 1904, Satunin, in ignorance of Matschie's paper, gave the name *septentrionalis* to a Transcaucasian tiger preserved in the Tiflis Museum of which he was Curator; and this was followed two years later by a long and complete description in German. He discussed the animal again in 1909, justifying the adoption of the name *septentrionalis* because of the preoccupation of *virgata* and because he thought it very possible that the Lenkoran example might turn out to be a different race of tiger from the one seen by Matschie, for which no precise locality was known. Since this view appears to me to be very improbable, I follow Lydekker's opinion that *virgata* and *septentrionalis* were applied to the same local race.

There is little, if any, difference in size between this tiger and the typical race from India; but the ground colour is a somewhat richer, darker red with the stripes more numerous, closer set and showing a tendency, at least in some specimens, to turn brown; the coat even in the summer appears to be thicker and in the winter the fringes on the sides of the face and along the belly arc very long, as is clearly shown in Heck's figure of the example described by Matschie. (Pl. D. lower fig.)

Satunin laid special stress on the colour of the stripes in distinguishing this race from the typical Indian tiger. He said:—'In all the Transcaspians and Lenkoran tigers seen by me the stripes on the shoulders, the hinder part of the neck and especially on the outer side of the thigh are not only not black but even pale brown.'

From this, and other points of view, the specimens in the British Museum which I refer to this race are extremely interesting in the great variation they exhibit, two having the stripes as black to all intents and purposes as Indian tigers, one having them partly brown and the other wholly brown.

These skins may be described briefly in the order named:—

1. An old tigress in perfect coat obtained in 1886 by Dr. Aitchison, of the Afghan Boundary Commission, on the Bala Murghab river to the north of Herat and identified as *Felis tigris*. The ground colour is rich tinted, rather darker and with the white areas more strongly defined than in any Indian tigers I have seen. The stripes are narrow, more numerous and closer set, quite black all down the spinal area, on the flanks and belly but faint on the



[Photo W. S. Berridge].

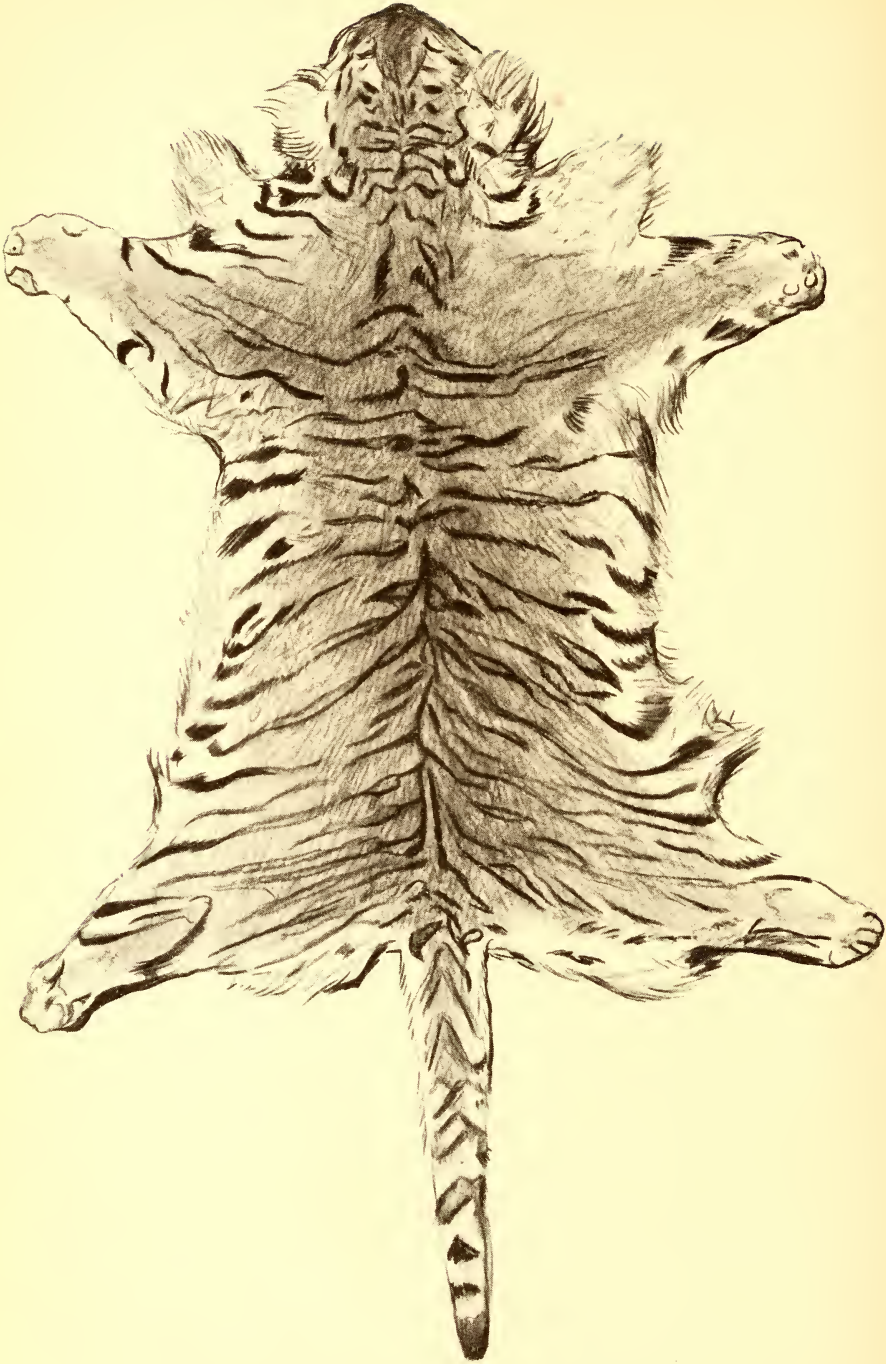
Tigress, from Nepal, showing unusual reduction in the stripes.



[Reproduced by the kind permission of Dr. Heck].

Tiger, from the Caucasus, in the Berlin Gardens.





SKIN OF AFGHAN TIGER.

fore part of the shoulder, and on the thighs and outer side of the hind leg indistinct and brown. It is noticeable that the upper ends of the stripes on the croup unite on each side to form a longitudinal stripe separated from its fellow by a median pale area. The coat is longish, thick and soft, much longer than in any Indian skin in the Museum. The stripes, however, in Indian skins generally, if not always, show a tendency to brownness at least low down on the thighs. (Pl. III.)

2. A mounted tigress obtained at Astrabad in N. Persia by Col. Beresford Lovett and presented to the British Museum in 1882. As in the Afghan specimen, the stripes are as black as in typical Indian tigers and are numerous and close-set, but the fusion of the croup stripes is not so emphatic. This tigress and the Afghan specimen apparently agree very closely in pattern with the photograph of the skin of the specimen shot by Col. R.L. Kennion in Mazanderan forest in Northern Persia.

3. A mounted male specimen labelled Persia and presented by Messrs. Rowland Ward. This also is a rich tinted specimen with numerous narrow stripes. On the top of the head and down the back the stripes are black, but they fade to brown on the flanks, and on the outside of the thighs they are only a little darker than the ground colour; they are also brown on the base of the tail and even on the belly and chest. The tendency toward the longitudinal fusion of the stripes on the croup is also noticeable. The white spot over the eye is smaller than in Indian tigers, and this appears to be a general feature in this race; but this specimen exhibits the peculiarity of having the spot on the back of the ear tan instead of white. This tiger resembles the specimens mentioned by Satunin in the brown tint of the stripes; but the brown is more extensive.

4. The dressed skin of a tigress ticketed 'Northern slopes of Mount Elburz¹' and presented by Col. R. L. Kennion who told me it was presented to him by a native chief. This tiger, represented in the coloured plate, is of extreme interest. The ground colour and the pattern are as in the Afghan specimen; but there is not a trace of black on the skin, all the stripes being brown and indistinctly defined owing to their approximation to the general hue of the coat. It is possible, of course, that this skin may represent a red variety, comparable to a red cat and coming into the same class as the black and white aberrations of the tiger above described. On the other hand it must be noted that the complete suppression of the black pigment in the stripes is merely an extension of the process observable to a lesser degree in the mounted male specimen described above. The available material, indeed, of this race seen by me and recorded by Satunin seems to show a nearly complete gradation between the black stripes typical of tigers in general and the reddish brown stripes of the Mount Elburz example. (Pl. I coloured.)

In the report upon the animals he collected as naturalist to the Afghan Boundary Commission, Dr. Aitchison (*Tr. Linn. Soc.*

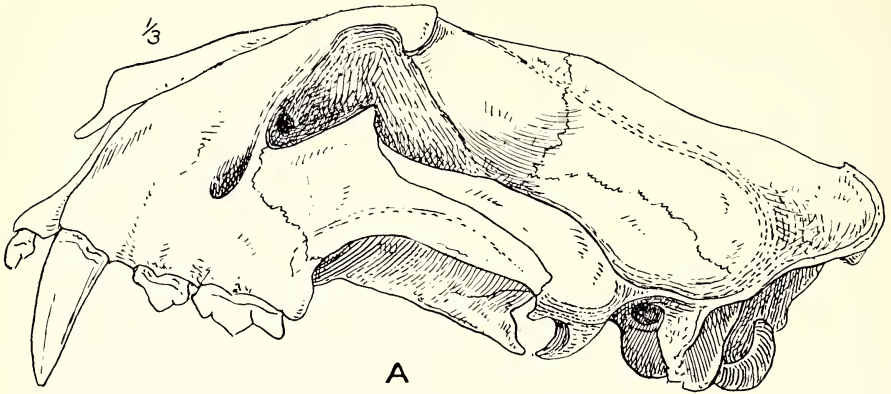
¹ Note:—On Pl. I representing this tiger, the locality was by error given as Caucasus. The error has been corrected to 'Elburz'.

Lond., Zool., vol. v, p. 56, 1888) states that the tigress above described was killed at Karaol Khana on the Bala Murghab river, which lies to the north of Herat, and brought into camp. She measured in the flesh 8 ft. $4\frac{3}{4}$ inches, and, as indicated by her worn teeth, was evidently old. Tracks of tigers were also seen in the valley of the Hari-rud and at the Chasma Salz pass at 5,000 ft. The tigers wander over the great rolling plains of the Badghis, ascending to higher altitudes in the summer and preying upon pig, orial and even ibex. Although taken from an old animal, the skin is in perfect condition with regard to coat and colour and has scarcely been stretched by being dressed.

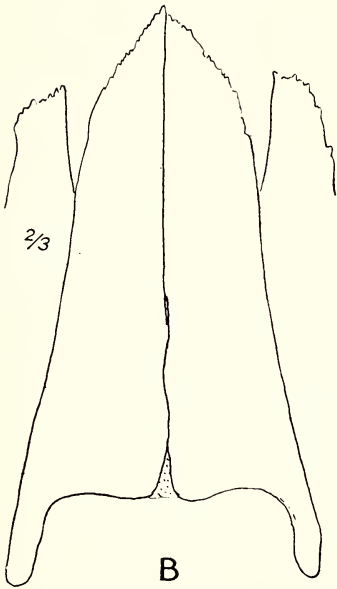
I can find no published particulars regarding the tiger, killed by Major C. E. Yate near Pindjeh, the skull of which is in the British Museum. It is not mentioned either in his book or in the report upon the collection he sent to Calcutta (*Journ. As. Soc. Bengal*, vol. 56, p. 68, 1887).

Col. R. L. Kennion gave an account of the shooting of the tiger he secured in Mazanderan forest in Northern Persia (*By Mountain, Lake and Plain. Sport in Eastern Persia*, p. 244, 1911). He described it as big as a good Indian tiger, the skin when pegged out measuring 11 ft. 6 ins., from which it may be inferred that the animal in the flesh measured 10 ft. 6 ins. or less. The coat, he adds, was of course nothing like that of a winter Siberian tiger but was perhaps a little longer than that of an Indian 'Christmas' tiger. Col. Kennion only came across two examples of this tiger; and there is reason to fear that the race is on the wane. Satunin, for example, records that when Radde made his first expedition to Transcaucasia in 1866, tigers were fairly plentiful; but were much scarcer in 1879-1880 when he visited the country again.

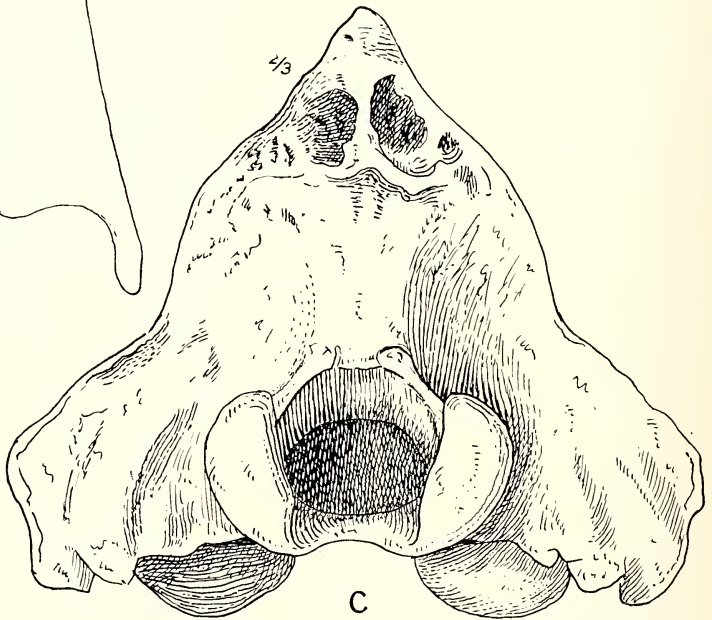
Records of the size of this tiger are few and unsatisfactory. The two stuffed specimens from Lenkoran in the Tiflis Museum measure as mounted, according to Satunin, about $9\frac{1}{2}$ ft. and $8\frac{1}{2}$ ft. respectively. They are probably tigresses. The dressed skin of Col. Kennion's red tigress from Mount Elburz is about 8 ft. 2 ins., and Dr. Aitchison's tigress from the Afghan boundary was $8\frac{1}{2}$ ft. in the flesh. This is the only reliable record. The newly stripped skin of the tiger shot by Col. Kennion in the Mazanderan forest measured, when pegged out, $11\frac{1}{2}$ ft. When dressed, the skin was reduced by Rowland Ward to 10 ft. 8 ins., which was probably about the natural length of the beast. From these imperfect data it may be inferred that this race of tigers is not larger, possibly it is on the average somewhat smaller than the typical Indian race. But I must not suppress a surprising record published by Satunin, who states that he saw in the flesh a Transcaspian tiger of 'colossal dimensions' . . . 'hardly smaller than an ordinary native horse.' Its stripped skin from the tip of the nose to the *root* of the tail (*italics mine*) was $3\frac{1}{2}$ metres—that is to say about $11\frac{1}{2}$ feet. This would have meant a total length of about $14\frac{1}{2}$ feet! I must leave it at that, with the comment that the learned Russian was not a sportsman 'out' for records.



A



B



C

- A. Skull of Tiger (*Panthera tigris septentrionalis*) from Maruchak, near Pinjdeh, on the Russo-Afghan frontier.
- B. Nasals and summit of maxillæ of the same.
- C. Posterior view of occiput of the same.

The following are the measurements and particulars of the skulls :—

Loc. and Sex.	English Inches.				Millimetres.			
	Total length.	Cond. bas. length.	Zygom. width.	Nasals.	Occiput.	Upper carn.	Lower carn.	Base of canine.
Lenkoran ♂ ...	14 $\frac{3}{8}$	...	...	...	...	...	...	...
Mazanderan ♂ ...	13 $\frac{1}{2}$	...	10	...	...	...	...	...
Pindjeh ♂ ...	13 $\frac{1}{2}$	11 $\frac{1}{4}$	9 $\frac{1}{10}$	4 $\frac{1}{2}$ × 2 $\frac{1}{4}$	3 $\frac{1}{10}$	37	25	26
Karaol Khana ♀ ...	11 $\frac{1}{2}$	10	8	3 $\frac{9}{10}$ × 2 $\frac{1}{5}$	2 $\frac{4}{5}$	32	21	19
Astrabad ♀ ...	...	10	7 $\frac{1}{3}$	3 $\frac{4}{5}$ × 2 $\frac{1}{10}$	2 $\frac{3}{5}$	32	21	21
Mt. Elburz ♀ ...	...	...	...	3 $\frac{3}{8}$ × 1 $\frac{9}{10}$	...	...	20	21

These measurements confirm the conclusion to be drawn from the skins that the Transcaspian tiger is about the size of an average Indian tiger; but the skull of the adult male from Pindjeh certainly differs from the skulls of typical Indian tigers in the shape of the dorsal profile. From the hinder edge of the postorbital processes, which is more elevated than in ordinary tigers, the forehead and nose slope tolerably evenly downwards and forwards to the end of nasals above the nostrils and behind the processes the upper edge of the skull slopes downwards and backwards at nearly the same angle of inclination to the occipital crest. The edge, however, is markedly sinuous but is much less concave than in typical Indian tigers owing to the elevation of the longitudinal crest which rises like a keel from the frontals a little behind the postorbital processes. In Indian tigers this crest is always lower over the frontals and parietals but increases somewhat rapidly in height towards the occiput, giving the characteristic concave curvature to the upper edge of the brain case. The differences above described may be seen by a comparison between my figure of the skull of the tiger from the Afghan Frontier and that of the one from the Central Provinces of India. For the rest it may be added that in the Afghan Frontier skull the occiput is remarkably broad and unstricted and that the nasals are shorter as compared with their width than in Indian tigers. (Pl. E.)

So far as I can judge from the photograph published by Satunin, the skull of a tiger from Talisch agrees very closely in shape with the one from the Afghan Frontier described above except that the upper edge of the median cranial crest is straighter; but in the skulls of the two tigresses from the Afghan Frontier and Astrabad

respectively the forehead is much more rounded resembling the forehead of Indian tigresses.

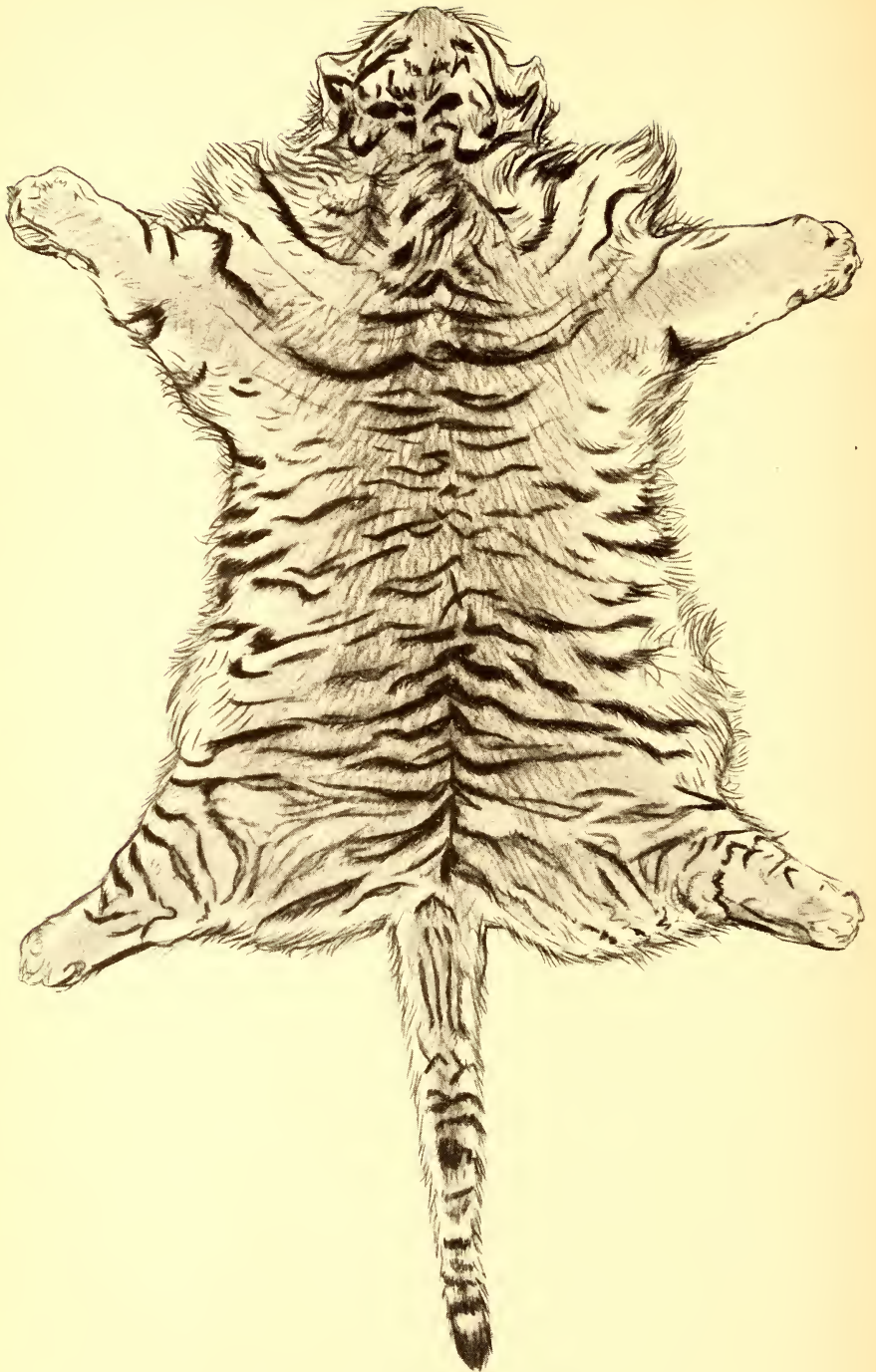
It is a curious and interesting fact that of all the tigers' skulls in the British Museum the one most like the male skull from the Afghan boundary is the male skull from Sungei Kumbang in Sumatra recorded below, although the latter has wider, shorter nasals and the lower cranial crest. The resemblance is all the more puzzling because the two races of tiger, so widely sundered geographically, are also much alike in the number and closeness of their stripes and the length of the fringe on the cheeks.

THE TIGERS OF MONGOLIA, MANCHURIA AND NORTH CHINA

In the account of the tigers of the Transcaspian area it was shown that they extend from the south-eastern slopes of the Caucasus to the Afghan boundary. From this district the species was formerly at all events continuously distributed in a north-easterly direction through Turkestan, Bokhara, the Altai and Mongolia as far as the Stanovoi mountains to the north of Manchuria. Records of their occurrence in these countries were incorporated by J. B. Brandt in his treatise on the geographical distribution of the species, published in 1859 (*Mem. Akad. Imp. St. Petersburg Sci. Nat.*, vol. viii, pp. 144-239). From Manchuria they pass southwards into Corea and at least through the eastern and central parts of China; but they were not encountered by the American zoological expedition through Shansi, Shensi and Kansu to the south of the Ordos desert in Mongolia (Clark and Sowerby, *Through Shen-Kan*, 1912). In southern China they are apparently plentiful and their occurrence as far to the west as Szechuen is attested by the skull of an immature male from that district in the British Museum.

Owing unfortunately to the need of properly localized material, our knowledge of the tigers of Central Asia, China and the areas to the north of that country, where they occur, is very defective; and accounts of them are in some cases bafflingly discrepant. For instance, Swinhoe (*Proc. Zool. Soc.*, 1864, p. 378) recorded a skin from Newchwang (Niu-chwang), south of Mukden, in the northernmost part of China, as pale coloured and scantily striped. Milne Edwardes, on the other hand, had one from North China which differed, he declared, from the skins of Indian, Cochinchinese and Javan tigers in having a longer and thicker coat and in being darker (*plus brune*) on the back (*Rech. Mamm.* i, p. 207, 1874). This author also quoted an item of information received from l'Abbé David to the effect that in Manchuria the tint of tigers varies from brownish black to white. Dode (*Proc. Zool. Soc.*, 1871, p. 480) described a skin from Amurland as having longer hair, less pronounced stripes and paler colour than Indian tigers; whereas D. G. Elliot (*Monograph of the Felidae*, 1883) figured a tiger from one of Dode's alleged Amurland skins, showing it to be not only darker but exceptionally heavily striped.

Korean tiger skins, imported into Japan, Temminck (*Fauna Japonica*, p. 28) long ago described as longer haired and paler



SKIN OF MANCHURIAN TIGER.

coloured than Indian tigers; but Dunbar Brander wrote of Korean tigers as follows:—‘In Korea such specimens as I saw, compared with the Indian beast, were higher on the leg, had a tendency to have withers, the neck appeared short and did not flow on from the shoulders as in the case of the Indian animal. In size and weight, however, they were inferior to Indian tigers. As I only saw a few specimens, I cannot say if these characters are general; but the Korean animal is essentially different from what one understands by a Manchurian tiger.’ (*Wild Animals in Central India*, p. 46, 1923). His conception of Manchurian tigers was expressed in a previous passage in which he classed them with the Siberian and Amurland tigers as ‘immense hairy animals, much larger than anything now found in India’. But it does not appear that he was here speaking of Manchurian tigers from his own knowledge in the field. Probably he knew them from imported skins, from general hearsay and from Rowland Ward’s Records.

However that may be, it is significant that Dode’s, Swinhoe’s and Temminck’s descriptions of skins from Amurland, Niuchwang and Korea respectively are in complete agreement, so far as they go, and point to the occurrence in those parts of Asia of a tiger which is paler coloured, less richly striped and thicker coated than the typical Indian animal. This conclusion is borne out by a skin which Mr. Swinhoe (*Proc. Zool. Soc.*, 1870, pp. 3–4) subsequently brought from Manchuria and sold to the British Museum, where it is still preserved. (Pl. IV). The coat is much longer and thicker than in any of the Indian skins in the collection, and is also paler in tint than all but those apparently faded by exposure to light as rugs, e.g. the skin from Coimbatore referred to above; and it is markedly paler than the skins from Mount Elburz and the Afghan boundary and is also thicker in the coat. There is a distinct mane about 2 in. long. It cannot be described as a well-striped skin as compared, for example, with Col. Sanderson’s Bengal example. The stripes are thicker and stronger on the hinder part of the body and croup than in the middle of the body behind the shoulders where they are narrower, shorter and more spaced. They are not markedly looped and they are blacker on the middle line than laterally. On the flanks they show a tendency to brownness, and this is still more evident on the outside of the shoulder and thighs; on the thighs they are so brown as to be quite obscurely defined. The skin is that of a male and I make its measurements as follows:—Head and body 90 ins., tail 42 ins., giving a total of 11 ft. If the tiger was that length in the flesh, he was a big beast; but the deduction of a foot or ten inches for stretching would bring him to about the size of an Indian tiger. Dressed skins, however, do not always stretch.

Very similar to Swinhoe’s Manchurian skin is a stuffed male specimen in the British Museum purchased from Rowland Ward and labelled Manchuria but entered in the register as Mongolia. It stands alongside a tiger from the Central Provinces and is certainly not a bigger animal. It is curious for the absence of the stripes on the flanks behind the shoulder. In this particular as in having a whiter tail and the base of the tail more normally striped, this tiger differs from Swinhoe’s skin, but it can hardly be doubted that the